

What is claimed is:

1. A broach assembly, comprising:

a plurality of broaching cutting inserts having a cutting surface;

a main body member having a plurality of spaced compression mounts formed thereon and

5 aligned in a row, each of said plurality of compression mounts having one of said plurality of cutting inserts positioned therein in an interference fit.

2. The broach assembly of claim 1, wherein each of said compression mounts is defined between adjacent spaced support members aligned in a row and defines a first portion of said main body member, wherein each of said plurality of cutting inserts is disposed in said interference fit between said adjacent spaced support members, and wherein one of said adjacent support members extends along and braces said cutting insert.

3. The broach assembly of claim 2, wherein said spaced support members are integrally formed with said main body member.

4. The broach assembly of claim 3, wherein said main body member has a plurality of spaced reliefs formed therein, each of said spaced reliefs is formed proximate one of said plurality of support members and opens into one of said plurality of compression mounts, and  
20 wherein each of said reliefs facilitates the movement of one of said adjacent spaced support members from a closed position to an open position and allows one of said plurality of cutting inserts to be moved relative to said main body member.

5. The broach assembly of claim 4, which further includes a plurality of actuation  
25 holes formed in said main body member, wherein each of said compression mounts has one of said

plurality of actuation holes associated therewith and connected to one of said plurality of spaced reliefs, and wherein each of said actuation holes is adapted to receive a tool that is operable to move a second portion of said main body member relative to the rest of said main body member and displace one of said adjacent support members.

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6. The broach assembly of claim 2, wherein said interference fit is within a range of about 0.0001 inches to about 0.002 inches.

7. The broach assembly of claim 1, wherein said main body member is elongated in a longitudinal direction and wherein said row of compression mounts is aligned substantially parallel with said longitudinal direction.

8. The broach assembly of claim 7, which further includes a mounting system for securely attaching said main body member to a support member.

9. The broach assembly of claim 2, which further includes mounting means for coupling the broach assembly to a broaching machine, and wherein said broaching machine is defined by a milling machine.

20 10. A broach assembly, comprising:

a carrier body having a plurality of integral support members aligned in a row and spaced along said carrier body;

a plurality of spacers aligned in said row and coupled to said carrier body, one of said plurality of spacers being located between an adjacent pair of said plurality of support members,

said pair of said plurality of support members defining a first support member and a second support member, and said one of said plurality of spacers abutting said first support member; and  
a cutting insert disposed between said second support member and said one of said plurality of spacers, said cutting insert being wedged between said one of said plurality of spacers  
5 and said second support member, and wherein said second support member braces a substantial length of said cutting insert during broaching.

11. The broach assembly of claim 10, wherein each of said plurality of spacers is coupled to said carrier body by a threaded fastener.

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12. The broach assembly of claim 11, wherein each of said plurality of spacers defines a wedge member.

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13. The broach assembly of claim 10, wherein said plurality of integral support members includes a plurality of pairs of adjacent integral support members, and each of said plurality of pairs of support members has one of said plurality of spacers located therebetween and abutting one of said support members of each of said pairs of support members, and which further includes one of said cutting inserts disposed between the other of said support members of each of said pairs of support members and said one of said plurality of spacers, and further wherein each of  
20 said cutting inserts is wedged between said one of said plurality of spacers and the other of said support members of each of said pairs of support members, and wherein each of said other of said support members braces along a substantial length of said cutting insert.

14. The broach assembly of claim 10, wherein said cutting insert has a lateral support surface which contacts said support member and said lateral support surface has a contour which minimizes lateral movement of said cutting insert.

5 15. The broach assembly of claim 14, wherein said contour of said lateral support surface includes a v-shaped profile.

16. The broach assembly of claim 14, wherein said contour of said lateral support surface includes a serrated profile.

10 17. The broach assembly of claim 10, wherein said carrier body has a first portion with said integral support members extending therefrom and a second portion with a cavity defined therein that is adapted to nest over a support member of a broaching machine.

15 18. The broaching assembly of claim 10, wherein said carrier body is elongated in a longitudinal direction, and wherein said plurality of integral support members and said plurality of spacers and said cutting insert are oriented substantially parallel with said longitudinal direction.

19. The broach assembly of claim 10, wherein said carrier body includes a first  
20 internal fluid flow passageway in fluid communication with a second fluid flow passageway defined in said one of said plurality of spacers and adapted to deliver a fluid through said one of said plurality of spacers to the cutting insert during the broaching operation.

20. The broaching assembly of claim 19, wherein said second fluid flow passageway is  
25 defined by a hole extending through said one of said plurality of spacers.

21. The broach assembly of claim 10, wherein said cutting insert is disposed in an interference fit between said second support member and said one of said plurality of spacers.

22. The broach assembly of claim 21, wherein said cutting insert has a first end and a  
5 second end, and wherein each of said first ends and said second ends have a cutting edge formed thereon.

23. The broach assembly of claim 10, which further includes quick change tool means for coupling the broach assembly to a broaching machine, and wherein said carrier body is coupled to said quick change tool means and said broaching machine is defined by a milling machine.

10 24. A method for reworking a unitary broach bar having a plurality of cutting teeth integrally formed on a broach bar, comprising:

15 providing at least one broach assembly having a carrier with a plurality of cutting inserts;  
removing a section of the unitary broach bar including a plurality of cutting teeth;  
positioning the at least one broach assembly on the broach bar in place of the section after  
said removing; and  
securing the at least one broach assembly to the broach bar with at least one coupling  
member.

20 25. The method of claim 24, wherein said removing forms a predetermined opening that is an integer multiple of the at least one broach assembly, and said providing includes an integer multiple of the at least one broach assembly corresponding to the predetermined opening.

26. The method of claim 24, which further includes forming coupling member receiving openings in the broach bar, and said securing includes passing said at least one coupling member through a mounting portion of the at least one broach assembly and engaging the coupling member receiving openings in the broach bar.

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27. The method of claim 24, wherein said removing includes an electrical discharge machining operation.

28. The method of claim 24, which further includes determining the appropriate length of the section to be removed before said removing, and said removing takes a predetermined length that enables the maintenance of a consistent pitch between the integrally formed teeth and the plurality of cutting inserts after said securing.

29. The method of claim 24, wherein said removing includes removing all of the cutting teeth integrally formed on the unitary broach bar.

30. The method of claim 29, wherein said providing includes a plurality of broach assemblies, and wherein said positioning includes positioning the plurality of broach assemblies on the broach bar, and further wherein said securing includes securing the plurality of broach assemblies to the broach bar.

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31. The method of claim 30, which further includes removing the plurality of broach assemblies from the broach bar after said securing, and which further includes providing a second plurality of broach assemblies, and which further includes positioning and securing the second plurality of broach assemblies to the broach bar.

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32. A broach, comprising:

a broach bar having a first portion including a plurality of integrally formed cutting teeth and a second receiver portion defining a section free of integrally formed cutting teeth; and at least one broach assembly having a plurality of removable cutting inserts mechanically coupled thereto, said at least one broach assembly coupled to said broach bar in said second receiver portion.

10 33. The broach of claim 32, wherein said second receiver portion is positioned between a first portion of integrally formed cutting teeth and a second portion of integrally formed cutting teeth.

15 34. The broach of claim 32, wherein said second receiver portion has been formed on said broach bar by removing a quantity of integrally formed cutting teeth.

35. The broach of claim 32, wherein said at least one broach assembly is coupled to said broach bar by a plurality of fasteners.

20 36. The broach of claim 32, wherein said broach assembly includes a body member having a plurality of spaced compression mounts formed thereon and aligned in a row, each of said plurality of compression mounts has one of said plurality of cutting inserts positioned therein in an interference fit.

37. The broach of claim 32, wherein said broach assembly comprises:

a carrier body having a plurality of integral support members aligned in a row and spaced along said carrier body;

a plurality of spacers aligned in said row and coupled to said carrier body, one of said plurality of spacers is located between each adjacent pair of said plurality of support members,

5 each of said adjacent pair of said plurality of support members defines a first support member and a second support member, and said one of said plurality of spacers abutting said first support member; and

one of said plurality of cutting inserts is disposed between each of said second support members and each of said one of said plurality of spacers, and each of said cutting inserts is wedged between said one of said plurality of spacers and second said support member, and wherein said second support member braces a substantial length of said cutting insert during broaching.

10 38. A method for forming a blade attachment slot in a gas turbine engine disk, comprising:

15 broaching the disk to remove material and define a blade attachment slot of a predetermined profile; and

running a substantially full form hone through the predetermined profile to flatten the surfaces of the disk after said broaching and produce a final blade attachment slot profile.

20 39. The method of claim 38, wherein the blade attachment slot is defined by a fir tree, and wherein a corresponding fir tree shape defines a cross section of the substantially full form hone.

40. The method of claim 38, wherein said broaching is a deep slotting operation, and wherein said broaching produces the blade attachment slot of the predetermined profile to within about 0.0015 inches of the final blade attachment slot profile.

5 41. The method of claim 38, wherein the broaching takes no more than two stages.

42. The method of claim 38, wherein the broaching occurs in multiple stages and the broach travels at about 65 surface feet per minute in at least one of stages.

10 43. A gas turbine engine disk, comprising:

a metallic disk having a first surface and an opposite second surface and a perimeter, said disk has a plurality of spaced blade attachment slots machined therein between said first surface and said opposite second surface and located around said perimeter, and a plurality of surfaces defined on said disk that form the blade attachment slots are substantially smooth and flat after a substantially full form honing process.

15 44. The gas turbine engine disk of claim 43, wherein each of said plurality of blade attachment slots is of a fir tree configuration.